

**IOT BASED SPEAKING SYSTEM FOR MUTE PEOPLE USING HAND GESTURE****Prof. Heena B Kachhela***Tulsiramji Gaikwad Patil College of Engineering and Technology, POLYTECHNIC  
heena.kachhela@gmail.com***Ms . Sakshi S Pathade***Tulsiramji Gaikwad Patil College of Engineering and Technology, POLYTECHNIC  
sakshipathade91@gmail.com***Prof. Sneha R Bhange***Tulsiramji Gaikwad Patil College of Engineering and Technology, POLYTECHNIC  
snehab.polytgpct.com***Ms . Palak O Bhoyar***Tulsiramji Gaikwad Patil College of Engineering and Technology, POLYTECHNIC  
palakbhoyar27@gmail.com***Mr. Kartik S Pardhi***Tulsiramji Gaikwad Patil College of Engineering and Technology, POLYTECHNIC  
kartikpardhi2004@gmail.com***Ms. Samiksha S Dekate***Tulsiramji Gaikwad Patil College of Engineering and Technology, POLYTECHNIC  
samikshadekate2004@gmail.com***Abstract**

Communication is the best medium for people to share their views with each other. About nine billion people in the world are deaf and dumb. The Communications between deaf-dumb with a normal person have always been a challenging task. Deaf and dumb people usually communicate via language, a form of illustration of words through hand and finger positions. To minimize this communication gap between normal person and these people for better interaction, we are developing an electronic device that can translate the sign language which is converted into speech to make proper communication between deaf and dumb people with normal person. The system consists of around 10 stored messages like "need help", "where is the toilet/washroom" and so on that help mute people convey basic messages. The system reads persons hand motions for different variations of hand movement.

**Keywords:** Flex sensor, Gesture recognition

**I. Introduction**

Communication with the other person is the best media for express our feelings, emotions through the words and sound. But some people cannot express his feelings, emotions through the word and sound those people are called as deaf and dumb. These people can express his feelings and emotions by using gesture and sign language but normal people don't understand his sign language, so for the proper communication between deaf and dumb with the normal person we are developing one device. By using this device deaf and dumb people can communicate with the normal person. The proposed system is used the sign language for the communication. In this project an electronic speaking system is develop to ease the communication process of speech impaired people. We design one glove which is fitted with the flex sensor in our hand then the flex sensor sense the signal and this signal given to the microcontroller whereas all the data kept in the database, then microcontroller matches the motion of hand with the database and produce the speech signal i.e. we will get the output through the speaker. The system

is also includes the text to speech conversion but in this system we can communicate with a long distance by using hand glove. In this system words are generated by a microcontroller i.e. we are using 10bit binary code in the form of 2048 words can be generated and these words will be transmitted in the form of voice calls with the help of GSM modem to communicate with a large distance in a phone calls. The need of this system is to give output in day-to-day life for "Speaking system for Dumb People by using hand gestures". It will explain the aim and whole declaration for the evaluation of system. It will also explain system constraints, interface and interactions with other external applications.

An attempt has also been made to explore about the need and motivation for interpreting ASL, which will provide opportunities for hearing impaired people in industry. This project is developed for the physically impaired people and would be beneficial as they can communicate with everyone. In this system a glove which is embedded with sensors will be wearied by physically impaired person, the physically impaired person will give a gesture. When he makes the gestures, it will be captured the

exact positions of the finger. The captured gesture will be mapped with the one previously stored and accordingly exact gesture from the database will be identified.

## II. Literature Review

These are a portion of the related papers identified with proposed framework. Writing Review goes about as the premise of research and investigation of the different ideas required for a specific area. It depicts the theories and different approaches that can be embraced keeping in mind the end goal to implement modules of the proposed framework. In this research of designing a system that will help dumb people to communicate in our surroundings. This research proposal is based on a very simple concept whereby we need to have a means for capturing the sign languages available to utilize them to solve the presented problem above, meaning using to translate them into speech so that voice impaired people can communicate.

Authors presented the static hand gesture recognition system using digital image processing. For hand gesture feature vector SIFT algorithm is used. The SIFT features have been computed at the edges which are invariant to scaling, rotation, addition of Noise. Paper Reviewed [5]: - An Automated System for Indian Sign Language Recognition In this paper a method for automatic recognition of signs on the basis of shape-based features is presented. For segmentation of hand region from the images, Otsu's thresholding algorithm is used, that chooses an optimal threshold to minimize the within- class variance of threshold black and white pixels. Features of segmented hand region are calculated using Hu's invariant moments that are fed to Artificial Neural Network.

## III. Problem Representation

About 34 million people are physical impaired since it has been difficult for the voice impaired people to deliver their messages to regular people, there is a time a dumb person needs help from regular person or vice versa, but the way to communicate become barrier.

This may be due to the lack of education about sign languages to the regular people, mute people fails to deliver their messages to the regular people and misunderstanding between sound impaired person and regular people.

To develop an electronic support system for avoiding communication gap between deaf-dumb and normal people we are using a gloves.

It covers a large distance by using phone calls to make a communication easier between deaf and dumb people with normal person.

The problem statement revolves around the idea of a camera based sign language recognition system that would be in use for the deaf for converting sign language gestures to text and then text to speech. Our objective is to design a solution that is intuitive

and simple.

Public announcements. Remember the last time you were at the airport and over a loudspeaker you were told boarding was in progress—or that the flight was delayed?

- Slow talkers.
- Being in the dark.
- Being “jumpy”
- Relying on touch.
- Sign language misunderstandings.

## IV. Methodology

Data for this study were collected from the population of about 26. The case study was at Ikuta in long a ward at Mbeya municipal. Structured and semi structured questionnaires were used as a data collection tool to administer the sample. However, interview was also used as a tool to collect data during my study.

The questionnaire was designed to focus and answer the research objectives. For qualitative data an open ended questionnaire was developed to seek respondent's attitudes, views and behaviors on speaking system for dumb people. Closed ended questions provide the participants with several answers from which they could chose while an open ended questions gave participants freedom to answer the questions in any manner they chose.

The study also uses Slovin's formula to compute the sample size of about 24 which was enough to represent the selected population of my study. Data collection allows us to collect information that we want to collect about our study object. Depending on my research type, any tool can be used. In my project I choose to use Questionnaire as data collecting tools. As the sample size, the lesser the probability that findings will be biased does hold, diminishing returns can quickly set in when samples get over a specific size which need to be balanced against the researcher's resources.

1. Transmitter circuit comprises of Flex sensor, Accelerometer, A- D convertor, Microcontroller.
2. Receiver comprises of Audio Module, Amplifier, and Speaker. Depending on the gesture made by with the help of flex sensor and accelerometer corresponding digital output is generated with the help of A to D converter.
3. This values are now send to the microcontroller. Microcontroller matches this values in the database. For specific match particular information is send to the receiver side.

### A. Battery Safety Information

- In the event of exposure to battery electrolyte, wash the area with soap and water. If acid enters the eyes, flood them with running cold water for at least 15 minutes and get immediate medical attention.

- Always wear eye protection, such as safety glasses, when working with batterie
- Remove all loose jewelry before working with batteries.
- Never work alone. Have someone assist you with the installation to be close enough to come to your aid when working with batteries.



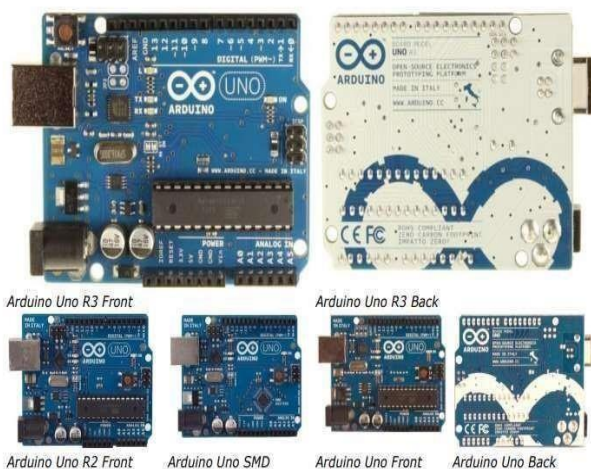
Fig . Battery

**B. Arduino Uno:**

The Arduino/Genuine Uno has a number of facilities for communicating with a computer, another Arduino/Genuine board, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An AT mega 16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The 16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on windows, an .inf file is required. Arduino Software (IDE) includes a serial monitor which allows simple textual data to be sent to and from the board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to serial chip and USB connection to the computers (but not for serial communication on pins 0 and.

**B. LCD Display**

**Arduino Uno**



controller is standard across many displays (HD 44780) which means many microcontrollers (including the Arduino) have libraries that make displaying messages as easy as a single line of code. A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in colour or monochrome. A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in colour or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden. For instance: preset words, digits, and seven- segment displays, as in a digital clock, are all good examples of devices with these. displays. They use the same basic technology, except that arbitrary images are made from a matrix of small pixels, while other displays have larger elements. LCDs can either be normally on (positive) or off (negative), depending on the polarizer arrangement. For example, a character positive LCD with a backlight will have black lettering on a Background that is the color of the backlight, and a character negative LCD will have a black background with the letters being of the same color as the backlight. Optical filters are added to white on blue LCDs to give them their characteristic appearance.



Fig .LCD Display

**C. Accelerometer (ADXL335):**



Fig. Accelerometer

Liquid Crystal Displays (LCD) An LCD is a small low- cost display. It is easy to interface with a micro-controller because of an embedded controller (the black blob on the back of the board). This

It is important to note that acceleration creates a force that is captured by the force- detection

mechanism of the accelerometer. So, the accelerometer really measures force, not acceleration; it basically measures acceleration indirectly through a force applied to one of the accelerometer's axes. An accelerometer is also an electromechanical device, including holes, cavities, springs, and channels, that is machined using micro fabrication technology. Accelerometers are fabricated in a multilayer wafer process, measuring acceleration forces by detecting the displacement of the mass relative to fixed electrodes.

**D. APR33a3 VOICE PLAY BACK**



Fig. APR33a3 VOICEPLAYBACK

Voice Record Module is based on ISD1820, which a multiple message record/playback device. It can offer true single chip voice recording, no volatile storage, and playback capability for 8 to 20 seconds. The sample is 3.2k and the total 20s for the Recorder. This module use is very easy which you could direct control by push button n on board or by Microcontroller such as Arduino, STM32, Chip Kit etc. From these, you can easy control record, playback and repeat and so on.

**F. Buzzer**



Fig. Buzzer

The buzzer consists of an outside case with two pins to attach it to power and ground. When current is applied to the buzzer it causes the ceramic disk to contract or expand. Changing this then causes the surrounding disc to vibrate. That's the sound that you hear.

**E. APR33A**



Fig. APR33A

Today's consumers demand the best in audio/voice.

They want crystal-clear sound wherever they are in whatever format they want to use. APLUS delivers the technology to enhance a listener's audio/voice experience. The aPR33A series are powerful audio processor along with high performance audio analogue-to-digital converters (ADCs) and digital-to-analogue converters (DACs). The aPR33A series are a fully integrated solution offering high performance and unparalleled integration with analogue input, digital processing, and analogue output functionality. The aPR33A series incorporates all the functionality required to perform demanding audio/voice applications. High quality audio/voice systems with lower bill-of-material costs can be implemented with the aPR33A series because of its integrated analogue data converters and full suite of quality-enhancing features such as sample-rate convertor.

**A. ATmega16**

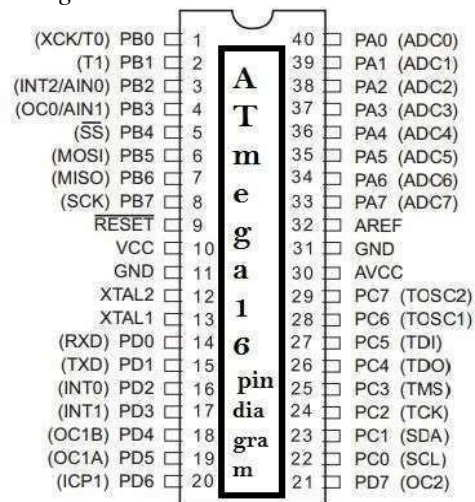


Fig. ATmega16

It is a 40-pin microcontroller. Each pin has its specifications. These are supports either input or output connections and these are divided into four ports. They are port A, B, C, D. The forty pins are categorized under these four ports. We can observe in its pin diagram. 8-bit microcontroller – ATmega16 is a high-performance microcontroller, and it can process 8bit data at a time. It takes 8 bits of data from memory. And utilize low power consumption.

**I. Flex Sensor**



Fig. Flex Sensor

A flex sensor or bend sensor is a sensor that measures the amount of deflection or bending. Usually, the sensor is stuck to the surface, and resistance of sensor element is varied by bending the surface. Other Applications – Flex sensors are common in different technological products, such as automotive and industrial controls, computer peripherals, joysticks, and measuring devices. These are also present in fitness products, musical instruments, and assistive technology systems of modern vehicles.

*J. Breadboards*

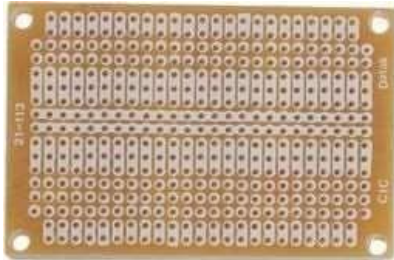


Fig. Breadboards

On one hand, a breadboard is usually used as the first step before creating a printed circuit board. You can change and move circuits that are otherwise permanent on a PCB with a breadboard. On the other hand, breadboards are used for design and investigation, while the boards are for your finished products.

*K. Capacitors*



Fig. Capacitors

A capacitor is an electrical component that draws energy from a battery and stores the energy. Inside, the terminals connect to two metal plates separated by a non-conducting substance. When activated, a capacitor quickly releases electricity in a tiny fraction of a second.

Capacitor, device for storing electrical energy, consisting of two conductors in proximity and insulated from each other. A simple example of such a storage device is the parallel plate capacitor.

*L. Speaker*



Fig. Speaker

Good performance, generally used for all types of audio projects. The speaker with resistance of 4 ohm and power rating equals to .5W. General warning alarm for some projects Simple amplifier projects. Will also fit in robots' projects.

*M. Resistors*

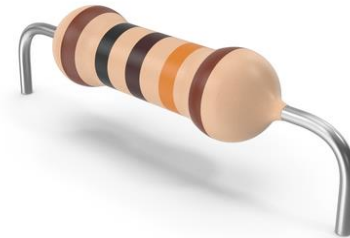


Fig. Resistors

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels to divide voltages, bias active elements, and terminate transmission lines, among other uses. A resistor is a little package of resistance: wire it into a circuit and you reduce the current by a precise amount. A resistor like this is described as wire-wound. The number of copper turns controls the resistance very precisely: the more copper turns, and the thinner the copper, the higher the resistance.

*N. Transistor*



Fig. Transistor

A transistor is a semiconductor device used to amplify or switch electronic signals and electrical power. Transistors are one of the basic building blocks of modern electronics. It is composed of semiconductor material usually with at least three terminals for connection to an external circuit.

*O. Push Button*

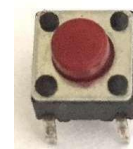


Fig. Push Button

Push buttons can be explained as simple power controlling switches of a machine or appliance. These are generally metal or thermoplastic switches that are intended to grant easy access to the user.

O. Jump Wire

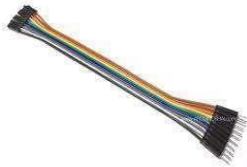


Fig. Jump Wire

Jumper wires typically come in three versions: male-to-male, male-to-female, and female-to-female. The difference between each is in the end point of the wire. Male ends have a pin protruding and can plug into things, while female ends do not and are used to plug things into. Male-to-male jumper wires are the most common and what you likely will use most often.

V. Working Flow

There are two units in this project. One is the transmitter circuit and other is the receiver circuit. Transmitter circuit comprises of Flex sensor, Accelerometer, A-D convertor, Microcontroller. Receiver comprises of Audio Module, Amplifier, and of flex sensor and accelerometer corresponding digital output is generated with the help of A to D converter. These values are now sent to the microcontroller. Microcontroller matches these values in the database.

For specific match particular information is send to the receiver side. Which generates sound for gesture. The proposed system included a new real time hand gesture recognition method that represented the segmented hand from Kinect images. The multi-scale descriptor consists of three sorts of parameters, which underscores the feature extraction. DTW Algorithm and neural network has been applied to achieve hand gesture recognition. Here in the first place, the hand was recognized utilizing the foundation subtraction strategy and the consequence of hand identification was changed to a twofold picture.

At that point, the fingers and palm were sectioned as appeared encourage the finger recognition. In addition, the fingers were identified and perceived. Ultimately, hand motions were perceived utilizing a basic rule classifier. These pictures were caught as appeared in with an ordinary camera. The yield of the hand identification was a binary picture in which the white pixels represented the individuals from the hand locale, while the dark pixels showed a place with the background.

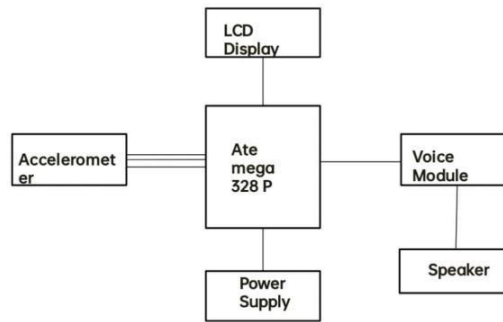


Fig. Block Diagram

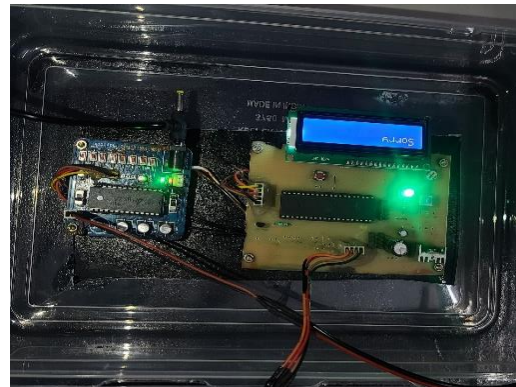


Fig. Working Flow

VI. Conclusion

This paper proposes an electronic design that can be used for communication between deaf, mute people and normal people. The following remarks could be a summary of the findings from this work. The design is more compatible and faster responsive when compared to existing design using PCA algorithm a responsive time of 2 to 3 seconds. More Compact and portable. Efficient communication between differently abled (deaf in this context) and normal people. Assign language involves different gestures and hand movement, improves small motor skills of differently abled people. A mobile application can be built for the efficient use of the design and to make it user friendly. In this project work, sign language will be more helpful for the ease of communication between the mute people and normal people. The project mainly aims at reducing the gap of communication between mute people and normal

people. Here the methodology intercepts the mute signs into speech. In this system it overcomes the difficulties faced by mute people and helps them in improving their manner. The projected system is very easy to carry to any place when compared to existing systems. To help the mute people, the language gets converted into text kind and on the digital display screen it will be displayed.

### VII.Future Scope

The completion of this project suggests that these data gloves can be used for partial sign language recognition. In future it can support more number of signs and different language mode.

We can make this system wireless so that it becomes handy and portable for commercial use.

Talking wireless using this we can even transmit the code to a mobile phone. It can also be used for secret military messages.

Here we propose a smart speaking system that help mute people in conveying their message to regular people using hand motions and gestures.

### References

1. Sunitha K. A1, Anitha Saraswathi.P2, Aarthi.M3, Jayapriya. K4, Lingam Sunny5, Deaf Mute Communication Interpreter- A Review, International Journal of Applied Engineering Research ISSN 0973-4562 Volume 11, Number 1 (2016).
2. Shoaib Ahmed .V, "MAGIC GLOVES (Hand Gesture Recognition and Voice Conversion System for Differentially Able Dumb People)", Tech Expo-The Global Summit, London 2012.
3. P A S Ram kumar1, N S N Lakshmipathi Raju2, T Saran kumar3, V Venkateswarulu4, Hand Gesture Recognition Using Sign Language Transcription System, Research Article Volume 6 Issue No.10, 2016 IJESC.
4. Kamalpreet Sharma, Naresh Kumar Garg," Hand Gestures Recognition for Deaf And Dumb", International Journal of Computer Application and Technology (s), May - 2014, pp. 10-13.
5. Sonal Garg, Shivani Singhal, Suman Kumari, A review paper on Hand Gesture Recognition and Voice conversion system, International Journal of Scientific & Engineering Research, Volume 6, Issue 10, October-2015.
6. 1G.Yella Reddy, 2M. Ramana Reddy, M.Tech, Ph. D, Design of Ultrasonic Spectacles, Flex Sensor Based Voice Generation and Speech to Text (Data) Conversion Techniques for Physically Disable People, IJRECE Vol-1, Issue-2, Oct - Nov, 2013.
7. Mangesh T Nikam1, Sonali R Ghodunde2, Kalyani V Sonawane3,Vidyarani R Gawade4, Talking Hands for Deaf and Dumb People, International Journal of Scientific & Engineering Research, Vol.04, Issue.03 February-2015.